REMARKS

This amendment is responsive to the Office Action of April 30, 2008. Reexamination and reconsideration of the application are respectfully requested.

The Office Action

Claims 77, 79–84, 86, 150, and 156–159 stand rejected under 35 USC §102(e) as being anticipated by Kumar (US Patent No. 6,795,179).

Claims 70, 72, 73, 75–77, 79, 80, 82–86, and 150–159 stand rejected under 35 USC §103(a) as being unpatentable over Kumar in view of Ulrichsen (EP 0 876 852 A1).

35 USC §102 REJECTION

The Examiner asserts that independent apparatus **claim 77** is anticipated by Kumar. Kumar uses a LIBS system, which means that it is the spectral properties of the plasma being generated by a laser pulse impinging upon the object's surface. A LIBS system does not use reflected radiation from the surface of the object to identify the object; it is an energy source for generating the plasma plume. Furthermore, the plasma generated by the laser pulse has no relation to the colour of the object whatsoever and it is the spectral properties of the plasma which are analysed to decide the atomic composition of the material.

Claim 77 recites that the determining arrangement uses reflected radiation which has been reflected from and varied by the objects being advanced and it is on the basis of this reflected and varied radiation that a determination of whether the object is or is not a CMYK-printed object is made.

In addition, the Examiner in the "Response to Arguments" section of the present Office Action states that the Applicant focuses on the sorting of CMYK-printed objects as a distinguishing feature. Another distinguishing feature upon which the Applicant relies and which has not been dealt with by the Examiner in the Office Action is that the claim requires there to be a specific spectral characteristic related to the colour of the object which characteristic is detectable by spectral analysis but is not detectable by the naked eye or a colour camera. Kumar only discloses characteristics related to colour which are detectable by a camera or the naked eye. This has been pointed out in prior responses, but does not appear to have been properly considered. The disclosure in Kumar at column 2 lines 29–33 is that the object of the invention thereof is to provide a system which is capable of rapidly sorting metal scrap particles, such as different aluminum alloy families, which may not be easily differentiated from each other by their colour (but can be differentiated by their atomic composition). This is a clear disclosure that the sorting system of Kumar is not one which relies upon a characteristic related to the colour of the object. The only information relating to colour disclosed in Kumar is obtained from the camera 36, and thus it is absolutely clear that this is not the characteristic related to colour as presently claimed (see column 15 lines 39–44 of Kumar).

The Examiner also rejects **claims 79–84, 86 and 156–159** as also being anticipated by Kumar. These dependent claims are, of course, allowable through their direct or indirect appendency to **claim 77**.

In addition, in relation to **claim 79**, the plurality of narrow wavelength bands is required to be at least 5. With regard to the Figures and parts of the disclosure of Kumar referred to by the Examiner, the number of monochromaters 90–96 in Kumar is four, which is not at least five, as recited in **claim 79**. Therefore, **claim 79** is patentable over Kumar.

Claim 80 (and parallel method **claim 73**) has been amended to recite that each wavelength band is between 20 and 50 nanometers in width. The narrow bands referred

to in Kumar are 0.05 to 0.01 nanometers in width which is a few hundreds of times smaller than those now claimed. Therefore, **claim 80** is patentable over Kumar.

As regards to the other claims rejected on the ground of anticipation, the Examiner has not shown where each and every element as set forth in each claim is found in Kumar either expressly or inherently.

For the reasons discussed above, independent **claims 70 and 77** along with **claims 72, 73, 75, 76, 79, 80, 82–86, and 150–159** which depend therefrom, are patentable over Kumar.

35 USC §103 REJECTION

Independent method **claim 70** and independent apparatus **claim 77** are rejected by the Examiner as being obvious over the disclosure in Kumar in view of Ulrichsen.

Kumar uses the spectral properties of a LIBS setup, which means, as has already been mentioned, that it observes the spectral properties of a laser-induced plasma generated from the objects being sorted. The radiation used in the analysis in a LIBS setup is not radiation which is reflected and varied from the surface of the objects being sorted, as recited by **claims 70 and 77**. The laser simply acts as an energy source for the creation of the vaporised plasma. The plasma generated by the laser pulse from the surface material of the object has no relation to the colour of the object whatsoever, and the spectral properties of the plasma analysed decides the atomic composition of the material.

One embodiment of the present invention deals with spectral properties of radiation reflected and varied from an object's surface. It is well known that different spectral distributions give rise to the same perceived colour, and colour cameras that are designed to have an eye-like response inherently have the same ambiguity. LIBS analysis of a material gives, as already mentioned, the atomic element composition and

does not provide any information whatsoever about the molecular structure in which the atoms are bound together. The absorption spectrum analysed by the present application originates from such molecular bonds of the material, which in turn decides what colour a material, such as ink or pigment, will have. This type of information is simply not obtainable from a LIBS system such as disclosed in Kumar.

It is respectfully pointed out that according to MPEP 2116 materials on which a process is carried out must be accorded weight in determining the patentability of a process. Neither Kumar nor Ulrichsen discloses sorting of CMYK-printed objects, as recited in **claims 70 and 77**.

In addition, the type of objects being sorted is not the only difference from Kumar as asserted by the Examiner. Again, there is the difference that the specific spectral characteristic being determined is one which relates to the colour of the objects and which characteristic is detectable by spectral analysis but is not detectable by the naked eye or a colour camera, as recited in **claims 70 and 77**. Again, neither of Kumar nor Ulrichsen teach or suggest such a feature.

In fact, the statistical variability of cellulosic fibrous objects, as being sorted in the present application, is so great that it would make using a neural network as disclosed in Kumar (which relies on specific inputs and algorithms) highly impractical and virtually useless for such purposes. Therefore, Kumar actually teaches away from the claimed subject matter of the present application. Thus, Applicants respectfully submit that a person of ordinary skill would not modify the invention of Kumar to sort a specific class of objects, as recited in **claims 70 and 77**.

It is also respectfully pointed out that a LIBS analysis is a destructive analysis, whereas measurement of the absorption spectrum as recited in the present claims is, clearly, a non-destructive measurement method. Other known disadvantages of a LIBS system is the vastly increased cost and system complexity, the difficulty in obtaining suitable standards, large interference effects (such as interference from different particle sizes),

detection limits are generally not as good as established techniques, there is poor precision of results and there is also the possibility of ocular damage by the high-energy laser pulses. Such disadvantages would lead to an unreliable system for sorting waste cellulosic, fibrous material where a high sorting purity is necessary.

The Examiner argues that the complex neural network system in Kumar can be trained to sort any object by spectral analysis. However, it is clear from Kumar that the inputs into the complex neural network are from various sources and with regards to any colour information, the disclosure is clear that this comes from the camera 36.

The Applicant would also respectfully submit that the interpretation the Examiner gives to the Kumar teaching is unfairly broad, since to say that it teaches the use of a complex neural network to analyse and identify different types of objects is just as general as saying that it teaches the use of mathematics to identify them. All that Kumar teaches is that such a complex neural network can be used to improve the accuracy of classification of material that requires its atomic composition to be identified for reliable sorting and that other inputs, such as image data from a camera, can assist in the sorting. It does not teach how to use such a complex neural network to sort "any object separable by spectral analysis" as stated by the Examiner.

For the reasons discussed above, independent **claims 70 and 77** along with **claims 72, 73, 75, 76, 79, 80, 82–86, and 150–159** which depend therefrom, are patentable over the combination of Kumar and Ulrichsen.

CONCLUSION

For the foregoing reasons, it is submitted that the claims of the present application are in condition for allowance. Early notice thereof is respectfully requested.

Should the Commissioner decide that any fee or fee deficiency is due, the Commissioner is hereby authorized to charge any and all such fees, and/or credit any

overpayments, incurred as a result of entering this amendment to Deposit Account No. 03-0172, Order No. 30316.04015.

Respectfully submitted,

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